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Self-Control and Need Satisfaction in Primetime: Television, Social Media, and Friends Can Enhance Regulatory Resources via Perceived Autonomy and Competence

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The relationship between self-control and media use is complicated. Loss of self-control capacity has been linked to generally higher levels of media use, which might represent self-regulatory failure, but could also be attempts at replenishing self-control. Indeed, self-determination theory proposes that satisfying intrinsic psychological needs (autonomy, competence, and relatedness), for example via media use, aids the recovery of self-control. In this 2-wave survey ($N = 395$), we examined the interplay of users' self-control capacity and their perceived satisfaction of autonomy, competence, and relatedness needs via media use and alternative leisure activities. Satisfaction of intrinsic needs during leisure activities increased self-control capacity at the end of the evening. Feelings of autonomy and competence during TV and social media use, and competence during socializing, positively contributed to greater self-control. However, respondents with less self-control capacity before primetime experienced less intrinsic need satisfaction while engaged with TV, social media, reading, sports, and socializing, diminishing self-control at bedtime.

Public Policy Relevance Statement
People can experience a loss of self-control, especially at the end of a long workday. This project investigated whether media play a positive role in restoring self-control, particularly by satisfying human needs to feel competent, autonomous, and related to others. We found that low self-control at the start of an evening led to less need satisfaction during media use, but that satisfying media experiences—at least in some cases—were beneficial for improving self-control.

Keywords: intrinsic needs, self-control, entertainment, leisure, recovery

Despite the frequent demonizing of entertainment media and its users ("couch potatoes" and "screen time") in popular and academic discourses (McCarthy, 2019), the pursuit of entertainment activities during leisure time has been found to be used for positive outcomes such as recreation, to find meaning, to soothe or repair the self, or to find respite from work and obligations (Reinecke & Eden, 2017; Zillmann, 2000). Given that time-use surveys find more than 50% of leisure time is spent on media consumption such as TV, radio, music, movies, reading, phones, and new technologies (Cloïn, 2012; McDonald & Johnson, 2013), examining leisure time media use in terms of its ability to restore, replenish, and revive users who are suffering from fatigue or depleted mental resources is important. Simply put, how does media use increase or decrease self-control, that is, an individual's capacity for intentional regulation of their behavior?

The relationship between fluctuations in self-control and leisure activities (such as entertainment media) has been scrutinized by psychologists (Hofmann, Baumeister, Förster, & Vohs, 2012), who found that media use was highest when the capacity for self-control was low. In other research, the loss of self-control capacity (the ability to intentionally regulate behaviors; Baumeister, Bratslavsky, Muraven, & Tice, 1998) has been linked to using media to procrastinate at work (Wagner, Barnes, Lim, & Ferris, 2012) and greater levels of media use (Panek, 2014). Low self-control

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capacity might result in greater media use due to self-regulatory failure (e.g., to resist temptations), but also because users try to recover self-control. Indeed, Ryan and Deci (2008) have argued that the satisfaction of intrinsic psychological needs (autonomy, competence, and relatedness) is an important means to the recovery of self-control—and media selection and enjoyment have been linked to the desire of users to satisfy these intrinsic psychological needs (Bray, Oliver, Graham, & Martin Ginis, 2013; Cheng & Wang, 2015; Reinecke, Klatt, & Krämer, 2011; Rhee & Kim, 2016; Rieger, Reinecke, & Bente, 2017; Rigby & Ryan, 2017; Tamborini, Bowman, Eden, Grizzard, & Organ, 2010; Velez, Ewoldsen, Hanus, Song, & Villarreal, 2018). Leisure-time media use thus has the potential to improve or reinforce self-control via the pathways of intrinsic need satisfaction.

Therefore, to understand the relationship between self-control and media use over time, and a potential role of media in replenishing self-control capacity, theory must incorporate an understanding of how media (and other leisure activities) satisfy basic psychological needs and may restore vitality and self-control. Although leisure pursuits have been linked to increased need satisfaction and well-being (Kuykendall, Tay, & Ng, 2015; Newman, Tay, & Diener, 2014), media, particularly TV, have been singled out as being less salubrious than other pursuits (Kuykendall et al., 2015). However, the link between users' fluctuations of self-control and intrinsic need satisfaction derived from media use in comparison with other pursuits has not yet been empirically tested. Thus, we suggest examining media use both alongside, and in comparison with, other leisure activities included in past work, such as socializing with friends, cultural activities, and sports.

The aim of the present study is to explore the reciprocal interplay of self-control capacity with media use and other leisure activities. To do so, we make use of self-report measures at the beginning and end of afterwork leisure hours, with a focus on how self-control impacts perceived need satisfaction via media use as well as other leisure activities, which then impact subsequent recovery of self-control. Findings are relevant for understanding the relationship between media use and recovery, as well as for understanding the mechanisms in restoring self-control via need satisfaction more broadly.

Self-Control and Its Uses

The concept of *self-control* refers to an individual's ability to exercise intentionality over their behavior (Hofmann, Friese, & Strack, 2009). Self-control varies within and between individuals; Baumeister and colleagues proposed a strength model in which self-control is a finite resource that can be temporarily used up or "depleted," but that can also grow if trained over time (Baumeister et al., 1998). However, recent meta-analyses (Carter, Kofler, Forster, & McCullough, 2015; Hagger, Wood, Stiff, & Chatzisarantis, 2010) and preregistered replications (Hagger et al., 2016; Lurquin et al., 2016; Xu et al., 2014) have cast doubt on the robustness and explanatory power of the strength model of self-control, especially its chief prediction that exerting self-control on a task will diminish the capacity for self-control on subsequent tasks. Yet, Dang et al. (2020) conducted a successful multilab replication of the ego-depletion effect.

That said, new theoretical accounts of self-control and its relationship to persistence, performance, and well-being have been proposed. What is called self-control may instead be an indicator of competition between distal and proximate motives (Fujita, 2011), shifts between motivation, attention, and emotion for specific types of goal-directed behaviors (Inzlicht, Schmeichel, & Macrae, 2014), or may be reflective of mental states of fatigue (Evans, Boggero, & Segerstrom, 2016). Regardless of the ongoing debate on the underlying psychological process that may explain self-control capacity, the general finding that self-control performance varies within individuals is well-documented (Hofmann et al., 2012). Despite the growing critique concerning the validity of the strength model of self-control as a theoretical explanation for these situational fluctuations, the empirical findings produced in this research tradition thus remain informative. In the following sections, we review research from different areas of self-control research and discuss the role of intrinsic need satisfaction as a potential theoretical link between self-control and media use.

Understanding self-control is important, because self-control allows the individual to make goal-consistent choices, persist at challenging tasks, and perform at an optimal level (Tangney, Baumeister, & Boone, 2004). Self-control is a predictor of life satisfaction and hedonic well-being (Hofmann, Luhmann, Fisher, Vohs, & Baumeister, 2014). A relatively open question is what types of activities can enhance and strengthen existing levels of self-control, or repair and restore depleted or diminished states. There is good indication that activities which are engaging and produce feelings of interest in the task can replenish self-control (Thoman, Smith, & Silvia, 2011; Tice, Baumeister, Shmueli, & Muraven, 2007). Additionally, self-control may be improved through the setting, monitoring, and implementation of goals (Inzlicht, Legault, & Teper, 2014). Similar types of self-determined activities are addressed by the literature on intrinsic motivation. Indeed, recent theoretical and empirical advances (Martela, DeHaan, & Ryan, 2016; Ryan & Deci, 2008) have linked the satisfaction of intrinsic needs to the replenishment of regulatory resources, that is, the capacity for self-control.

Self-Determination and Self-Control

In contrast to other social psychological theories of self-control such as the model by Baumeister et al. (1998) that focus on processes of depletion of resources, self-determination theory (SDT; Ryan & Deci, 2000) discusses the processes and boundary conditions that help to maintain and cultivate self-regulatory resources (Ryan & Deci, 2008). A central theoretical construct that connects the SDT perspective with other theories of self-control is vitality. Vitality refers to "one's conscious experience of possessing energy and aliveness" (Ryan & Frederick, 1997, p. 530) that "one can harness or regulate for purposive actions" (Ryan & Deci, 2008, p. 703). Although the notion of vitality builds on a broader conceptualization of self-regulatory resources than the situational self-control capacities addressed in the ego-depletion literature, both concepts show considerable overlap. Accordingly, vitality provides a theoretical bridge between self-control research and research in the area of media-induced need satisfaction.

Just like self-control capacity, vitality is positively related to performance and task persistence (Muraven, Gagné, & Rosman, 2008). More importantly, a series of experiments by Muraven et al. (2008) suggest that declines in self-control performance due to ego depletion are mediated by subjective vitality, suggesting that vi-

tality and ego depletion "are tapping into the same phenomenon" (Ryan & Deci, 2008, p. 711). Accordingly, processes and activities that increase vitality should also counteract ego depletion and increase self-control capacity.

In fact, a large body of SDT research finds that intrinsically motivated behaviors, those which satisfy psychological needs of autonomy, competence, and relatedness, can restore vitality compared with behaviors that are extrinsically motivated and require effortful self-control (Martela et al., 2016; Ryan & Deci, 2008). For example, autonomy in task choice produces more subsequent effort in a later task, especially compared with forced choice (Murayama et al., 2015) or extrinsically motivated choice (e.g., social pressure to choose a certain task; Halfmann & Rieger, 2019; Moller, Deci, & Ryan, 2006; or ego-involved tasks, Nix, Ryan, Manly, & Deci, 1999). Additional support for a significant role of intrinsic need satisfaction for self-control processes comes from survey research demonstrating positive associations between the satisfaction of intrinsic needs and increased levels of vitality (Legault, Ray, Hudgins, Pelosi, & Shannon, 2017; Tummers, Steijn, Nevicka, & Heerema, 2018), well-being (Kuykendall et al., 2015; Newman et al., 2014), self-reported work performance (Van den Broeck, Vansteenkiste, De Witte, Soenens, & Lens, 2010), and less burnout (Sulea, van Beek, Sarbescu, Virga, & Schaufeli, 2015). Similar findings are also provided by diary studies that found effects of daily autonomy, competence, and relatedness need satisfaction on day-level fluctuations in vitality (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Sheldon, Ryan, & Reis, 1996). In sum, research indicates that intrinsically motivated behavior and the satisfaction of intrinsic needs helps to maintain and restore vitality and self-control capacity.

Media Use and Intrinsic Motivation

The strong relationship between intrinsic need satisfaction and self-control discussed earlier is crucial for understanding the interplay of self-control and media use, as a growing number of studies suggest that media use is a significant source of intrinsic need satisfaction. Media use is sought and enjoyed for many reasons, but the satisfaction of the intrinsic needs of autonomy, competence, and relatedness in particular have been found to be central to media enjoyment (Peng, Lin, Pfeiffer, & Winn, 2012; Reinecke et al., 2012; Reinecke, Vorderer, & Knop, 2014; Ryan, Rigby, & Przybylski, 2006; Schmierbach, Xu, Oeldorf-Hirsch, & Dardis, 2012; Tamborini et al., 2010, 2011).

Previous research has demonstrated that very different forms of media use can elicit intrinsic need satisfaction via different mechanisms. A number of studies have demonstrated that the control over the gaming environment and the constant performance feedback of video games is a significant source of autonomy and competence need satisfaction (Ryan et al., 2006; Tamborini et al., 2010, 2011). Furthermore, thwarted competence and autonomy needs were associated with selective exposure to video games in an experiment by Reinecke et al. (2012). In addition to the autonomy and competence need satisfaction provided by single-player games, online and multiplayer games are also a significant source of relatedness need satisfaction (Ryan et al., 2006; Schmierbach et al., 2012; Tamborini et al., 2010). Other research has addressed intrinsic need satisfaction in social media. Two studies by Sheldon, Abad, and Hinsch (2011) demonstrated that Facebook use significantly contributes to relatedness need satisfaction and that feelings of disconnectedness increase Facebook use. In addition to relatedness need satisfaction, findings from Reinecke, Vorderer, et al. (2014) show that Facebook use is also associated with competence and autonomy need satisfaction. Intrinsic need satisfaction is not exclusively provided by interactive media such as video games or social media, but also by relatively noninteractive media such as movies or TV. For example, in a study by Rieger, Reinecke, Frischlich, and Bente (2014), exposure to emotionally and cognitively challenging movie stimuli was predictive of feelings of mastery, which are conceptually close to competence need satisfaction. Furthermore, audiences' parasocial contact with TV characters can effectively satisfy social relationship needs (Hartmann, 2017). However, less research exists on how relatively noninteractive media satisfy intrinsic needs, or how they compare to interactive media.

Overall, the reviewed research demonstrates a strong potential of media use to elicit intrinsic need satisfaction. Given the strong interplay of intrinsic motivation and self-control processes discussed earlier, this suggests that intrinsic needs and self-control should show reciprocal influences in the context of media use. These mutual interactions of self-control and media exposure are reviewed in the following sections.

Self-Control Affects the Subjective Experience of Media Use

Media use can have a positive effect on self-control capacity. However, depleted people might struggle to functionally use media to repair self-control resources, despite their greater need for restoration. This is because when depleted, people tend to be attracted toward nonchallenging content that might be less capable in restoring self-control, and also may be more likely to perceive their own media use in a negative light, as a goal conflict, or a waste of time. Indeed, low levels of self-control appear to lead to the selection of content that is easy to process, and to avoidance of emotionally or cognitively challenging content (Eden, Hartmann, & Reinecke, 2015; Eden, Johnson, & Hartmann, 2018; Reinecke, Hartmann, & Eden, 2014). Using such content might not effectively induce the satisfaction of intrinsic needs for mastery or competence, given that it lacks the effort requirements demanded by more challenging content.

Furthermore, users, in a state of depletion, more frequently engage in, particularly, unchallenging media use, even if this conflicts with other goals and obligations, resulting in negative perceptions of media use as a form of procrastination or bad behavior (Meier, Reinecke, & Meltzer, 2016; Müller, Fieseler, Meckel, & Suphan, 2018; Panek, 2014; Reinecke, Hartmann, et al., 2014; Reinecke et al., 2018). These negative perceptions might effectively undermine the media's potential to recover depleted self-control. For example, users' experience of reduced volition control over their media use (if they perceive it as a form of procrastination) should decrease feelings of autonomy, thus impairing intrinsic need satisfaction during media use (Reinecke, Vorderer, et al., 2014).

Noting this potentially undermining effect of a negative perception of media use among depleted individuals is important, as depleted individuals will nevertheless be more likely to select media over other activities. For example, people are more likely to

seek out video games (Reinecke, 2009) when their resources are depleted. When they felt high levels of mental and physical exhaustion, experience sampling study participants reported that they were more likely to use TV, Internet, gaming, and other media for purposes of recovery (Reinecke & Hofmann, 2016). Google searches on the day after the change to Daylight Saving Time show more results for entertainment options, given the lost sleep and fatigue associated with the time change (Wagner et al., 2012).

As a consequence of both the content selection patterns and the reduced experience of self-determination in media use associated with impaired self-control capacity, individuals low on self-control may benefit *less* from media use in terms of intrinsic need satisfaction than users in full possession of their self-control. This is critical, as it suggests different recovery outcomes of media use for individuals high versus low in self-control capacity: Nondepleted users should experience gains in self-control and recovery, due to the perception of satisfying autonomy and other intrinsic needs while choosing and using media (or other leisure activities). Users with low levels of self-control, however, have a smaller chance of perceiving their media use as self-determined and intrinsically satisfying, thus making recovery effects on self-control less likely (Legault & Inzlicht, 2013; Martela & Ryan, 2016; Moller et al., 2006).

Experiences of Media Use Affect Self-Control

The growing evidence linking media use and intrinsic need satisfaction discussed previously suggests that media use may restore thwarted intrinsic needs and can be an important route to recovery from fatigue and diminished self-control (Reinecke & Eden, 2017). In fact, a number of studies have linked a wide variety of media use to improvement of self-control, performance, and vitality (Bray et al., 2013; Cheng & Wang, 2015; Reinecke et al., 2011; Rhee & Kim, 2016; Rieger et al., 2017). A variety of findings show that exposure to TV and film (Csikszentmihalyi & Kubey, 1981; Derrick, 2013; Rieger et al., 2014, 2017), humor in TV (Cheng & Wang, 2015; Tice et al., 2007), video games (Reinecke, 2009; Reinecke et al., 2011), social media (Rhee & Kim, 2016), and music (Bray et al., 2013) can all produce recovery experiences and increased vitality and self-control.

Yet not all media use is beneficial for self-control. Data from Reinecke, Vorderer, et al. (2014) reveal that the social pressure to use Facebook experienced by many users undermines the satisfaction of the need for autonomy. The use of mobile and social media may heighten stress and strain if it activates feelings of anxiety, lack of control (Horwood & Anglim, 2019), social pressure, fear of missing out, or information overload (Reinecke et al., 2017). Additionally, subjective perceptions of media use matter for self-control. Effects of experimentally induced autonomy or relatedness on regulatory resources (Tummers et al., 2018) have been shown to be mediated by perceived self-determination (Legault & Inzlicht, 2013; Martela & Ryan, 2016; Moller et al., 2006). Heightened need satisfaction during mobile phone use (due to a lack of social pressure) heightened vitality and lowered stress (Halfmann & Rieger, 2019). Conversely, forming negative appraisals of TV or video game use (viewing it as procrastination and feeling guilty as a result) can produce harmful, rather than positive, effects of exposure on self-control recovery and vitality (Exelmans, Meier, Reinecke, & Van Den Bulck, 2019; Reinecke, Hartmann, et al., 2014). This negative perception of use was predicated by a lack of self-control in the first place, suggesting a spiral of effects.

Overall, this evidence suggests that the subjective perception of activities, as to whether they satisfy intrinsic needs, are key to producing effects on improved self-control. As demonstrated earlier, some media or leisure activities may be more effective sources of recreation via intrinsic need satisfaction than others, because people subjectively perceive them to be intrinsically more rewarding than others. Furthermore, findings (Reinecke et al., 2011; Reinecke, Hartmann, et al., 2014) underline the initially suggested assumption that the relationship between media use and self-control is not unidirectional (i.e., media use affects self-control) but reciprocal (i.e., self-control also affects media use). Accordingly, having reviewed findings that indicate how media use (through subjective perception of intrinsic need satisfaction) affects self-control, we turn to explore the effects of self-control on media use (and subjective perception of intrinsic need satisfaction) in the next section.

Current Study

Given the preceding review, we will empirically examine how self-control affects need satisfaction during leisure activities, and how that need satisfaction affects self-control in turn. We assess prevalent media platforms (TV, gaming, social media, and print media) but also compare them in conjunction with other potentially need-satisfying leisure activities such as face-to-face socializing, sports, and attending cultural events. Comparing mediated with nonmediated activities is central to understanding when, how, and why media users select media versus other leisure time activities, and the subsequent effects this selection and use has on self-control resources. Additionally, it addresses questions about the appropriateness of users who simply collapse on the couch at night—are they squandering what limited self-control remains, or are they functionally selecting leisure which can best restore their energy?

Based on findings reviewed earlier, which suggest that higher levels of self-control lead to selective exposure to activities that are more challenging, engaging, and provide more opportunities for intrinsic need satisfaction, we propose that self-control at Time 1 (t1) will positively predict perceived (Hypothesis 1) autonomy, (Hypothesis 2) competence, and (Hypothesis 3) relatedness while engaging with (a) watching TV, (b) playing games, (c) using social media, (d) reading print media, (e) talking with friends, (f) playing sports, and (g) attending cultural activities. Note that these predictions imply that people with lower self-control capacity should be less prone to satisfy intrinsic needs while engaging in these activities (or might even opt out of engaging activities that could provide such satisfaction altogether). It remains unclear, however, whether this effect equally applies to all forms of leisure activities. We thus pose the research question to what extent the effects of self-control on perceptions vary between activities (Research Question 1)?

Based on the broad body of SDT research linking intrinsic need satisfaction to increased vitality and self-regulatory resources, we predict that perceived (Hypothesis 4) autonomy, (Hypothesis 5) competence, and (Hypothesis 6) relatedness will positively predict self-control at Time 2 (t2) while engaging in activities (a) through (g) listed earlier. Finally, we examine to what extent perceptions of

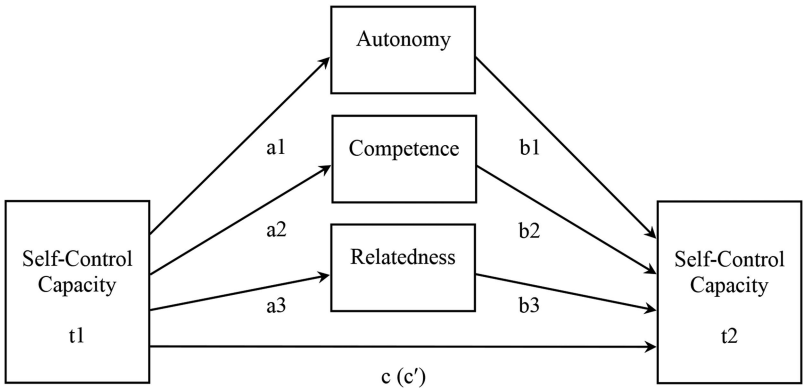

Figure 1. Conceptual model. Paths a1, a2, a3, b1, b2, and b3 correspond to Hypotheses 1, 2, 3, 4, 5, and 6, respectively. Path labels also correspond to reported coefficients in Table 2.

(Hypothesis 7) autonomy, (Hypothesis 8) competence, and (Hypothesis 9) relatedness while engaging with activities (a) through (g) mediate the relationship between self-control at t1 and t2. Our conceptual model is presented in Figure 1. These last three hypotheses will involve partial mediation. Self-control at t1 certainly predicts self-control at t2, and leisure activities may therefore only mediate a portion of the relationship.

Method

Participants and Procedure

Participants were recruited and compensated by a survey company in the Netherlands, Novio Research. A total of 669 adult survey panelists were invited to respond to a two-part study. Surveys were conducted, in Dutch, across weekdays in a 2-week period in June 2015. For the present study, only participants are included who reported their self-control levels and perceptions of at least one leisure activity they engaged in that evening ($N = 395$; $M_{age} = 43.57$, $SD = 13.40$; 61.3% women). Other data set variables are reported elsewhere (Eden et al., 2017).

In the first part of the study, administered between 17:00–19:30, respondents reported their demographics and their self-control capacity. In the second part of the survey, administered between 22:00–1:00 on the same evening as the first part, respondents indicated which leisure activities they had engaged in during the evening, and for how long. They also reported their perceptions of the activities and their self-control capacity. Afterward participants were thanked and compensated.

Measures

Self-control capacity at t1. Self-control was measured with the 25 items of the State Self-Control Capacity Scale (Ciarocco, Twenge, Muraven, & Tice, 2012; Reinecke, Hartmann, et al., 2014). The items (e.g., "If I were given a difficult task right now, I would give up easily," 1 [*strongly disagree*] to 7 [*strongly agree*]) formed a reliable scale, $\alpha = .961$.

Activities and durations. At t2, respondents identified any of the following leisure activities they had engaged in since t1: talking with friends, playing sports, attending cultural activities, watching TV, playing games, using social media, and reading print media. They also indicated how many minutes had been spent on each activity. Categories were derived from the American Time Use Survey (Bureau of Labor Statistics, 2014).

Need satisfaction. For each activity they participated in, respondents gave their t2 perceptions of how they felt during the activity. Participants were asked "How did you feel about <*activity*>?" and responded to "I was free to make a choice," "Made me feel competent," and "Made me feel connected to others" from 1 (*strongly disagree*) to 5 (*strongly agree*). These single-item measures were used to efficiently capture perceived autonomy, competence, and relatedness for each activity. Previous work has shown the validity of single-item measures of the need satisfaction of specific activities (Reis et al., 2000; Sheldon & Elliot, 1999; Wilson, Longley, Muon, Rodgers, & Murray, 2006).

Self-control capacity at t2. Finally, participants reported their self-control capacity at this second time point. The same scale was used as at t1, $\alpha = .956$.

Results

Descriptive Statistics

Self-control was somewhat stronger at t1, $M = 4.60$, $SD = 1.12$, than at t2, $M = 4.39$, $SD = 1.05$, $t(394) = -4.58$, $p < .001$, $d = .198$, indicating lower levels of self-control at the end of the evening. Self-control was highly correlated at t1 and t2, $r(395) = .630$, $p < .001$.

With regard to leisure activities, 71.6% of the sample watched TV, 49.9% used social media, 27.3% read print media, 14.9% played games, 12.9% played sports, and 11.9% socialized with friends. Too few respondents reported cultural activities (3%) for reliably testing its relationship with self-control, so this behavior is not included in hypothesis testing. Activities were not mutually exclusive; respondents could report that they engaged in many or few (or none: 8.6% of the initial sample) of the activities. The modal response was two of these activities (38.7% of the sample). The time spent on activities was reported in minutes (see Table 1).

The descriptives for perceptions of activities' need satisfactions are reported in Table 1. Intercorrelations of need satisfactions for a given

activity ranged from −.03 to .64. In particular, autonomy and competence were correlated for gaming, $r = .405$, $p = .001$, and friends, $r = .422$, $p = .003$. Autonomy and relatedness were correlated for social media, $r = .376$, $p < .001$, and friends, $r = .332$, $p = .023$. Competence and relatedness were correlated for TV, $r = .643$, $p < .001$, social media, $r = .451$, $p < .001$, reading, $r = .532$, $p < .001$, gaming, $r = .408$, $p = .001$, sports, $r = .351$, $p = .011$, and friends, $r = .535$, $p < .001$.

Analysis Plan

Mediation models were tested in the PROCESS macro for SPSS (Hayes, 2018). Satisfaction of the three needs of autonomy, competence, and relatedness were modeled as parallel mediators of the relationship between self-control capacity at t1 and self-control capacity at t2. This allowed us to account for the direct influence of self-control at t1 on self-control at t2, and to examine both the influence of self-control on evening activities as well as the influence of those activities on subsequent self-control. Respondents only provided their perceptions of the activity if they had actually engaged in it during the evening. So, for each activity, we tested the mediation model for those who participated in the activity.

It should be noted that self-control at t1 only affected engagement for some leisure activities. Logistic regression with t1 self-control as sole predictor showed effects on likelihood of engagement with friends, $b = 0.319$, $SE = 0.146$, Wald = 4.73, $p = .030$, Δ Nagelkerke $R^2 = .024$; sports, $b = 0.325$, $SE = 0.142$, Wald = 5.276, $p = .022$, Δ Nagelkerke $R^2 = .026$; and reading, $b = 0.190$, $SE = 0.104$, Wald = 3.356, $p = .067$, Δ Nagelkerke $R^2 = .013$; but none on likelihood of engagement with TV, social media, games, or cultural activities. To further account for the extent of activity, time spent with that activity was included as a covariate in the results that follow. This is because time spent reading was weakly correlated with t1 self-control, $r = .106$, $p = .035$, and t2 self-control, $r = .133$, $p = .008$, and time spent with friends was weakly correlated with t1 self-control, $r = .117$, $p = .020$, but not t2 self-control, $r = .060$, $p = .232$. To control for any influence of time, we retained it as a precaution. However, in none of the regression models was time spent with an activity predictive of t2 self-control, nor did removing the time variables as controls alter any mediation results.

Main Analyses

Results for the mediation models used to test hypotheses are presented in Table 2. Self-control capacity was a positive predictor of feeling greater autonomy during all activities except for gaming, generally supporting Hypothesis 1. More self-control was predictive of more perceived competence while socializing with friends (and, marginally, while playing sports), partially supporting Hypothesis 2. Additionally, more self-control led to greater perceived relatedness during social media use and socializing with friends, partially supporting Hypothesis 3.

This pattern of results indicates, first of all, that particular activities are differentially linked to need satisfaction, depending on the presence or relative absence of self-control. This answers Research Question 1, suggesting that greater self-control generally allows for activity engagement in ways that increase intrinsic need satisfaction.

Results further indicate that intrinsic need satisfaction during several of the evening activities positively predicted self-control capacity at t2. Experiencing greater autonomy and competence during TV and social media use resulted in more self-control capacity at the end of the evening. This supports Hypotheses 4a, 4c, 5a, and 5c. Surprisingly, there was no effect of relatedness during social media use on self-control capacity, so Hypothesis 6c was not supported. However, perceived competence during socializing with friends was a positive predictor of end-of-evening self-control, supporting Hypothesis 6e. In contrast to previous work, perceptions of gaming were not linked to self-control capacity (cf. Reinecke, Hartmann, et al., 2014) so that Hypotheses 4b, 5b, and 6b were not supported.

Across all subsamples engaging in various activities, self-control capacity at the beginning of the evening was highly predictive of self-control at the end of the evening. Examining bootstrapped indirect effects via the PROCESS macro (Hayes, 2018) revealed that self-control capacity at t1 was further linked to heightened self-control capacity at t2 via perceptions of autonomous TV (Hypothesis 7a) and social media usage (Hypothesis 7c), and competence during socializing with friends (Hypothesis 8e). Initial levels of self-control at the beginning of the evening allowed for media use and social interactions that helped to maintain or enhance self-control.

These mediation effects were modest in their size. As expected, the direct effect between t1 and t2 self-control was strong (Table 2, Row 8), albeit smaller once mediators were added to the model (i.e., smaller than the total effect). The effect size of the mediation paths can be assessed by the *completely standardized effect* (ab_{cs}; Hayes, 2018, pp. 135–136). The indirect effects for TV autonomy, $ab_{cs} = .0172$, $SE = .0089$, 95% confidence interval (CI) [.0037, .0390], and social media autonomy, $ab_{cs} = .0315$, $SE = .0178$,

Table 1
Descriptive Statistics for Evening Leisure Activities

	Television ($n = 280$)	Social media ($n = 196$)	Reading ($n = 108$)	Games ($n = 58$)	Sports ($n = 51$)	Friends ($n = 47$)	Culture ($n = 12$)
Variables	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Time	79.00 (70.47)	24.05 (33.96)	28.69 (29.35)	34.20 (46.73)	41.78 (38.94)	75.96 (70.79)	22.50 (46.34)
Autonomy	4.19 (0.71)	4.02 (0.73)	4.27 (0.68)	4.07 (0.83)	4.35 (0.66)	4.04 (0.81)	3.50 (1.00)
Competence	2.70 (0.94)	2.79 (0.92)	3.05 (0.84)	3.22 (0.98)	3.80 (0.92)	3.55 (0.95)	3.33 (0.78)
Relatedness	2.57 (0.97)	3.52 (0.87)	2.66 (0.88)	2.91 (1.11)	3.02 (1.19)	4.09 (0.72)	3.58 (0.79)

Note. Scores are for those who participated in these activities. Time is measured in minutes.

Table 2
Mediation Models for Self-Control Capacity and Intrinsic Need Satisfaction During Evening Leisure Activities

Effect	Television	Social media	Reading	Games	Sports	Friends
	b (*SE*) [95% CI]	*b* (*SE*) [95% CI]	*b* (*SE*) [95% CI]	*b* (*SE*) [95% CI]	*b* (*SE*) [95% CI]	*b* (*SE*) [95% CI]
a1: SC1 → Autonomy	**.097**** **(.037)**	**.165***** **(.046)**	**.168**** **(.055)**	.160 (.096)	**.195*** **(.417)**	**.283*** **(.107)**
a2: SC1 → Competence	.074 (.050)	.078 (.059)	.115 (.072)	−.013 (.116)	.193† (.111)	**.452***** **(.117)**
a3: SC1 → Relatedness	.026 (.052)	**.167**** **(.055)**	.102 (.076)	−.196 (.133)	.113 (.148)	**.274**** **(.092)**
b1: Autonomy → SC2	**.163*** **(.065)**	**.179*** **(.080)**	.013 (.128)	.069 (.126)	−.017 (.171)	−.234 (.152)
b2: Competence → SC2	**.157*** **(.063)**	**.177**** **(.066)**	.216† (.112)	.179 (.114)	−.051 (.127)	**.438**** **(.150)**
b3: Relatedness → SC2	−.013 (.061)	−.100 (.076)	−.194† (.107)	.052 (.093)	−.094 (.094)	.114 (.188)
c: SC1 → SC2	**.610***** **(.041)**	**.635***** **(.049)**	**.538***** **(.071)**	**.821***** **(.086)**	**.630***** **(.088)**	**.589***** **(.113)**
c′: SC1 → SC2	**.583***** **(.041)**	**.609***** **(.050)**	**.531***** **(.075)**	**.822***** **(0.88)**	**.654***** **(.097)**	**.426**** **(.122)**
Indirect: SC1 → Autonomy → SC2	**.016 (.008) [.004, .036]**	**.029 (.017) [.0017, .071]**	.002 (.023) [−.041, .059]	.011 (.042) [−.018, .162]	−.003 (.033) [−.076, .054]	−.066 (.056) [−.187, .043]
Indirect: SC1 → Competence → SC2	.012 (.011) [−.002, .041]	.014 (.013) [−.004, .051]	.025 (.022) [−.002, .085]	−.002 (.040) [−.101, .076]	−.010 (.029) [−.094, .027]	**.198 (.065) [.084, .343]**
Indirect: SC1 → Relatedness → SC2	−.0003 (.004) [−.013, .006]	−.017 (.016) [−.062, .004]	−.020 (.022) [−.086, .008]	−.010 (.038) [−.129, .032]	−.011 (.024) [−.105, .015]	.031 (.053) [−.056, .174]
Model R^2	.475***	.498***	.390***	.665***	.546***	.528**

Note. CI = confidence interval; SC1 = self-control at Time 1; SC2 = self-control at Time 2. Model for each activity controls for minutes spent on each activity. However, activity duration was not predictive of SC2, nor did it alter effects. Indirect effects were tested with 1,000 bootstrap samples. Unstandardized coefficients are indicated. Significant effects are in bold.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

95% CI [.0032, .0742], were small in magnitude, whereas the indirect effect of friendship autonomy, ab_{cs} = .2082, *SE* = .0659, 95% CI [.0980, .3561], was of a medium size.

Discussion

The present study found that the satisfaction of autonomy, competence, and relatedness needs during primetime leisure activities was predicted by, and predictive of, self-control capacity measured at two time points in the evening. This finding provides support for an integrated view of intrinsic needs and self-control recovery (Martela et al., 2016; Ryan & Deci, 2008) and illustrates that specific activities exhibit relationships with self-control that are dependent on the nature of the pursuit (e.g., differences between social media and face-to-face interaction). In general, this study sheds further light on how entertainment and other leisure activities are connected to self-control processes, and how media can or cannot be used to manage responses to daily stress and exhaustion to replenish a strained and depleted self.

Self-control capacity was positively predicted by intrinsic need satisfaction during several evening activities. Experiencing greater autonomy and competence during TV and social media use resulted in more self-control capacity at the end of the evening. In contrast to our expectations, there was no effect of relatedness during social media use on self-control capacity, nor were perceptions of gaming linked to subsequent self-control capacity (cf. Reinecke, Hartmann, et al., 2014). This suggests it is not necessarily the interactivity or social nature of the activity but rather the subjective perception of need satisfaction that drives recovery. Watching TV, for instance, might induce recovery as long as it is perceived as an autonomous, competent, and social activity.

However, although people in the present study restored self-control the more they perceived themselves as autonomous and competent in their TV and social media use, these effects were rather small. In contrast, recovery was more substantially tied to feelings of competence while interacting with friends. It could be speculated that talking with friends (in contrast to watching TV alone or browsing through social media postings) poses the risk of failure to adhere to personal or social standards, like listening attentively or contributing to a meaningful conversation. Accordingly, the observed substantial (positive) effects of competence need satisfaction on subsequent self-control might suggest that feeling competent while talking with friends does not only induce recovery, but particularly feeling incompetent harms recovery.

The proposed relevance of people's subjective experience of intrinsic need satisfaction in recovery is further underlined by our findings regarding the effects of initial self-control on need satisfaction. In the present study, self-control affected perceptions of need satisfaction during most of the presented leisure activities, although this effect varied depending on which activity and which need was being addressed. In general, participants with higher self-control benefited more from media use, but the more depleted users were, the less they perceived their leisure time activities, including media use, as intrinsically satisfying. For example, participants with lower initial self-control felt less socially related during subsequent face-to-face and mediated interactions with friends, and less competent in socializing and sports. The additional mediation analyses revealed that, in summary, perceptions of TV and social media as autonomously driven, and perceptions

of competence during socialization with friends, both partially mediated the relationship between self-control at t1 and t2. For example, people in need of recovery due to lower initial self-control at t1 were less prone to feel autonomous in their TV and social media use and competent in their interactions with friends, and, therefore, suffered from a relatively lower subsequent self-control at t2.

Overall, we found that participants with stronger self-control at t1 generally experienced stronger perceived need satisfaction via all leisure activities. Regulatory capacity allows for more effortful action, decision-making, and thus autonomy in most domains, but self-control also appears to allow for more engaging and effective interpersonal interactions both face-to-face and via social media. Face-to-face interactions (and sports) are also experienced as better able to satisfy competence needs when self-control is present. These findings are in line with the conceptualization of self-control in terms of ability of our participants to regulate goals and behaviors in a way that will result in greater long-term satisfaction (Hofmann et al., 2009). Participants with higher self-control were able to engage in leisure time activities in such a way that they felt intrinsically satisfying. Even the behaviors that did not satisfy all basic psychological needs were still able to satisfy some needs for participants, and thus illustrate functional need satisfaction in daily life. In contrast, people suffering from low levels of self-control were less prone to experience their leisure time activities, including media use, as intrinsically rewarding, thus potentially revealing a reinforcing, dysfunctional pattern of leisure time pursuit.

These findings leave us with open questions for future research. Among media users in the primetime hours, why does autonomy play a greater role in revitalizing self-control, whereas competence and relatedness do not? Under what conditions do TV and social media, as well as other media such as video games, produce revitalization through different needs? And, when are mediated activities preferred over nonmediated activities? Face-to-face interaction with friends was especially effective in producing competence and subsequent self-control, yet respondents were far more likely to spend time with media than to engage in face-to-face activities. It might be speculated that depleted individuals fail to choose what makes them (intrinsically) happy or induces effective recovery. This could be either the result of controlled choices that suffer from severe forecasting errors (Hsee & Hastie, 2006) or the result of impulsive choices or media habits that are determined by situational cues and are largely blind to future outcomes (Hofmann et al., 2009; Schnauber-Stockmann, Meier, & Reinecke, 2018).

Furthermore, given the prominent role of media in leisure hours, why is there a normative perception of media being a displacer of worthier nonmediated activities, and what role do perceptions of procrastination and guilt play in this perception? Others have argued that perceptions of enjoyment are driven by need satisfaction (Tamborini et al., 2010), which is in line with our results. But, if this is the case, then why do media users describe their habits as "guilty pleasures" and as preventing them from achieving other long-term goals (Reinecke, Hartmann, et al., 2014)? What role do other perceptions of leisure activity—for example, the extent to which it is challenging, normatively valued, hedonically pleasant, or in line with long-term goals—play in the perception of leisure-based need satisfaction?

Additionally, even if individuals initially find their media use intrinsically satisfying, there can be too much of a good thing (Galak & Redden, 2018). Currently, binge-watching behavior is becoming more and more prevalent (Rubenking & Bracken, 2018), with people feeling "addicted" to TV, and stressing the lack of perceived autonomy over, for example, their own Netflix queue (Flayelle, Maurage, Vögele, Karila, & Billieux, 2019). We may posit that what starts as a functional, need-satisfying media behavior (e.g., for nondepleted users) may turn into a more compulsive or obligatory (and even extrinsically motivated) behavior that is unsatisfying and leads to greater depletion and less restoration of self-control. However, given the limitations of the single-night diary study in the current work, we were not able to assess long-term leisure patterns, nor changes based on technological acquisitions such as video-on-demand services.

Limitations of the present study should be considered. First of all, although a strength of the present design is its use of two key time points, the study does investigate changes in self-control over a relatively short time span (a single weekday evening). Self-control capacity can ebb and flow over longer periods of time, and different leisure activities may produce further effects on maintenance and restoration of vitality over longer periods of time, or at additional junctures in time (e.g., weekends). Given that results show a reinforcing pattern of self-control reproducing itself via need satisfaction, it is important to assess what happens when self-control reaches minimum or maximum levels, and especially how individuals recover from reinforcing spirals of poor self-control and diminished need satisfaction. Future research should also consider the role of afterhours work and household duties in self-control levels and the accessibility of leisure; for many individuals, a stressful day does not end at 17:00. Cultural differences in the length of working hours, and how leisure is structured, also present a limitation in our ability to generalize beyond the Dutch context.

Another limitation is that the quality of self-reports at the end of the day (between 22:00 and 1:00) may be lessened, especially for fatigued individuals; however, to the extent that self-reports were accurate, asking about evening leisure activities right after their conclusion minimizes errors in recall. Additionally, the study does not account for multitasking. Leisure activities may be undertaken in combination with extrinsically motivated activities, or multiple leisure activities may be pursued at once. The present data certainly capture some multitasking, by allowing participants to report total time spent on each given activity, but we did not examine primary versus secondary tasks. Perhaps primary activities have more potential to satisfy needs, or the presence of a second activity may help or hinder.

A further limitation was that some activities yielded relatively small subsamples; analyses were not conducted on cultural activities for this reason. Yet the statistical power to detect effects for video game play, sports, and socializing with friends was also diminished. With gaming, for example, a subsample of 58 only has .64 power to detect a medium-sized correlation of $r = .3$, and .33 power to detect a smaller effect of $r = .2$ (Faul, Erdfelder, Buchner, & Lang, 2009). To this end, unobserved effects for these behaviors might be due to Type II error.

The use of single-item measures for each intrinsic need limited the content validity and reliability of measures. And, finally, another limitation is that by relying on self-reports of how satisfying each medium or activity was perceived to be, we lack information about the features of the activity itself. So-

cializing with friends could be purely pleasurable or take an awkward turn into conflict. TV programs might be easy and mindless, or tense and complex. Critically, the data are not able to assess whether self-control leads to selection of specific content that is more satisfying (e.g., more autonomy-invoking TV programs or social media interactions), or whether the presence of self-control instead facilitates autonomy-boosting interpretations and perceptions of otherwise similar content. So, future research should investigate the extent to which the effect of self-control capacity on subsequent need satisfaction is due to selective exposure to particular types of messages and activities, or due to differences in processing.

In this study, we demonstrated that the satisfaction of intrinsic needs during afterwork leisure hours boosts self-control capacity, but that it is individuals who already possess more self-control who experience the greatest satisfaction. In particular, TV and social media use were felt as more autonomous, and socializing with friends was experienced as more competent, when the individual began the evening with more self-control capacity. These intrinsically satisfying experiences produced more self-control, which supports an integrated view of self-determination theory and self-control (Martela et al., 2016; Ryan & Deci, 2008). These insights are important, as the strength model of self-control is being revised and reworked in light of the reproducibility crisis in psychology (Hagger et al., 2016; Lurquin et al., 2016; Xu et al., 2014), and the implications of self-determination for media use continue to be investigated (Reinecke & Eden, 2017; Rigby & Ryan, 2017). The results from the current study highlight how and when self-control may be partially recovered through leisure-time satisfaction of basic psychological needs.

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